AMENDMENT

Amendments to the Claims: Please replace all prior versions and listings of claims with the following listing of claims.

LISTING OF CLAIMS:

1-12. **(Cancelled)**

13. **(Currently Amended)** A method for component to service mapping in service level management, comprising:

providing a service over a network having a plurality of network components that support the service, wherein performance of the service depends upon performances of the plurality of network components that support the service, and wherein the service has a state that represents the performance of the service;

monitoring a plurality of component parameters for the plurality of network components that support the service across a plurality of domains of the network;

mapping the plurality of component parameters monitored across the plurality of domains of the network to a service parameter that represents the state of the service, wherein the state of the service indicates whether the service conforms to an agreed upon service level identified in a service level agreement;

monitoring the service parameter that represents the state of the service to detect a change in the state of the service; and

determining a cause of the change in the state of the service in response to detecting the change in the state of the service, wherein determining the cause of the change in the state of the service includes:

executing one or more data mining algorithms to discover respective influences on the service parameter for a first subset of the monitored component parameters in a first domain of the plurality of domains of the network;

executing the one or more data mining algorithms to discover respective influences on the service parameter for a second subset of the monitored component parameters in a second domain of the plurality of domains of the network; ~~and~~

identifying ~~at least~~ one of the ~~component parameters in the~~ first subset of the monitored component parameters or the second subset of the monitored component parameters as including the cause of the change in the state of the service; and

identifying at least one of the component parameters in the identified subset of the monitored component parameters as the cause of the change in the state of the service.

14. (**Previously Presented**) The method of claim 13, wherein the service parameter has a value that indicates whether the state of the service conforms to the agreed upon service level identified in the service level agreement.

15. (**Previously Presented**) The method of claim 14, wherein determining the cause of the change in the state of the service further includes organizing the plurality of component parameters monitored across the plurality of domains of the network into a time ordered set of parameter vectors that reflect the state of the service over an interval that includes a plurality of time increments.

16. (**Previously Presented**) The method of claim 15, wherein monitoring the service parameter to detect the change in the state of the service includes:

determining that the time ordered set of parameter vectors reflects that the state of the service conformed to the agreed upon service level at a first one of the plurality of time increments in the interval; and

detecting the change in the state of the service in response to the time ordered set of parameter vectors further reflecting that the state of the service did not conform to the agreed upon service level at a second one of the plurality of time increments in the interval.

17. (**Previously Presented**) The method of claim 15, wherein monitoring the service parameter to detect the change in the state of the service includes:

determining that the time ordered set of parameter vectors reflects that the state of the service did not conform to the agreed upon service level at a first one of the plurality of time increments in the interval; and

detecting the change in the state of the service in response to the time ordered set of parameter vectors further reflecting that the state of the service conformed to the agreed upon service level at a second one of the plurality of time increments in the interval.

18. (**Previously Presented**) The method of claim 13, further comprising generating an alarm in response to detecting the change in the state of the service.

19. (**Previously Presented**) The method of claim 13, wherein the one or more data mining algorithms include a rule induction algorithm that comprises producing a plurality of rules that represent the respective influences that the first subset of the monitored component parameters have on the service parameter and the respective influences that the second subset of the monitored component parameters have on the service parameter.

20. (**Previously Presented**) The method of claim 19, wherein the one or more rules include one or more of propositional statements or quantified statements that represent the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

21. (**Previously Presented**) The method of claim 19, wherein the one or more data mining algorithms further include a neural network algorithm that comprises:

identifying a case library that includes a plurality of cases representing episodes of problem solving;

applying the plurality of rules to identify one or more of the cases in the case library that are relevant to discovering the respective influences for the first subset of the monitored component parameters and the second subset of the monitored component parameters; and

adapting one or more solution variable associated with the identified cases using parameterized adaptation logic to discover the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

22. (**Previously Presented**) The method of claim 13, wherein the one or more data mining algorithms include a decision tree algorithm that comprises:

producing a decision tree that represents the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter; and

representing the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter using one or more of numeric values or binary values.

23. (**Previously Presented**) The method of claim 13, wherein the one or more data mining algorithms include a top N algorithm that comprises:

identifying a predetermined number of the component parameters in the first subset of the monitored component parameters and the second subset of the monitored component parameters that have a greatest influence on the service parameter; and

producing a list that includes the identified component parameters having the greatest influence on the service parameter, wherein the identified component parameters are listed in a decreasing order of the respective influences that the identified component parameters have on the service parameter.

24. (**Previously Presented**) The method of claim 13, wherein the one or more data mining algorithms include an inductive logic algorithm that comprises:

incorporating knowledge relating to the plurality of domains of the network and knowledge relating to the first subset of the monitored component parameters and the second subset of the monitored component parameters within a rule base;

inferring the respective influences that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter using the knowledge incorporated within the rule base; and

producing one or more of propositional statements or quantified statements that express the respective influences that the each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

25. (**Previously Presented**) The method of claim 13, wherein the one or more data mining algorithms include a fuzzy logic algorithm that comprises:

translating the first subset of the monitored component parameters and the second subset of the monitored component parameters into a plurality of respective fuzzy concepts;

determining grades of membership that the first subset of the monitored component parameters and the second subset of the monitored component parameters have in the respective fuzzy concepts, wherein the grades of membership quantify transitions between a plurality of states in a state transition graph; and

inferring the respective influences that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter from the grades of membership that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have in the respective fuzzy concepts.

26. (**Cancelled**)

27. (**Currently Amended**) A system for component to service mapping in service level management, comprising:

a network having a plurality of network components that support a service provided over the network, wherein performance of the service depends upon performances of the plurality of network components that support the service, and wherein the service has a state that represents the performance of the service;

a plurality of monitoring agents that monitor a plurality of component parameters for the plurality of component parameters that support service across a plurality of domains of the network; and

a network management system configured to:

map the plurality of component parameters monitored across the plurality of domains of the network a service parameter that represents the state of the service, wherein the state of the service indicates whether the service conforms to an agreed upon service level identified in a service level agreement;

monitor the service parameter that represents the state of the service to detect a change in the state of the service;

execute one or more data mining algorithms to discover respective influences on the service parameter for a first subset of the monitored component parameters in a first domain of the plurality of domains of the network in response to detecting the change in the state of the service;

execute the one or more data mining algorithms to discover respective influences on the service parameter for a second subset of the monitored component parameters in a second domain of the plurality of domains of the network in response to detecting the change in the state of the service; ~~and~~

identify ~~at least~~ one of the ~~component parameters in the~~ first subset of the monitored component parameters or the second subset of the monitored component parameters as <u>including</u> the cause of the change in the state of the service<u>; and</u>

identify at least one of the component parameters in the identified subset of the monitored component parameters as the cause of the change in the state of the service.

28. (**Previously Presented**) The system of claim 27, wherein the service parameter has a value that indicates whether the state of the service conforms to the agreed upon service level identified in the service level agreement.

29. (**Previously Presented**) The system of claim 28, wherein the network management system is further configured to organize the plurality of component parameters monitored across the plurality of domains of the network into a time ordered set of parameter vectors that reflect the state of the service over an interval that includes a plurality of time increments.

30. (**Previously Presented**) The system of claim 29, wherein the network management system is further configured to:

determine that the time ordered set of parameter vectors reflects that the state of the service conformed to the agreed upon service level at a first one of the plurality of time increments in the interval; and

detect the change in the state of the service in response to the time ordered set of parameter vectors further reflecting that the state of the service did not conform to the agreed upon service level at a second one of the plurality of time increments in the interval.

31. (**Previously Presented**) The system of claim 29, wherein the network management system is further configured to:

determine that the time ordered set of parameter vectors reflects that the state of the service did not conform to the agreed upon service level at a first one of the plurality of time increments in the interval; and

detect the change in the state of the service in response to the time ordered set of parameter vectors further reflecting that the state of the service conformed to the agreed upon service level at a second one of the plurality of time increments in the interval.

32. (**Previously Presented**) The system of claim 27, wherein the one or more data mining algorithms include a rule induction algorithm that comprises producing a plurality of rules that represent the respective influences that the first subset of the monitored component parameters have on the service parameter and the respective influences that the second subset of the monitored component parameters have on the service parameter.

33. (**Previously Presented**) The system of claim 32, wherein the one or more rules include one or more of propositional statements or quantified statements that represent the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

34. (**Previously Presented**) The system of claim 32, wherein the one or more data mining algorithms further include a neural network algorithm that comprises:

identifying a case library that includes a plurality of cases representing episodes of problem solving;

applying the plurality of rules to identify one or more of the cases in the case library that are relevant to discovering the respective influences for the first subset of the monitored component parameters and the second subset of the monitored component parameters; and

adapting one or more solution variable associated with the identified cases using parameterized adaptation logic to discover the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

35. (**Previously Presented**) The system of claim 27, wherein the one or more data mining algorithms include a decision tree algorithm that comprises:

producing a decision tree that represents the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter; and

representing the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter using one or more of numeric values or binary values.

36. (**Previously Presented**) The system of claim 27, wherein the network management system is further configured to generate an alarm in response to detecting the change in the state of the service.

37. (**Previously Presented**) The system of claim 27, wherein the one or more data mining algorithms include a top N algorithm that comprises:

identifying a predetermined number of the component parameters in the first subset of the monitored component parameters and the second subset of the monitored component parameters that have a greatest influence on the service parameter; and

producing a list that includes the identified component parameters having the greatest influence on the service parameter, wherein the identified component parameters are listed in a decreasing order of the respective influences that the identified component parameters have on the service parameter.

38. (**Previously Presented**) The system of claim 27, wherein the one or more data mining algorithms include an inductive logic algorithm that comprises:

incorporating knowledge relating to the plurality of domains of the network and knowledge relating to the first subset of the monitored component parameters and the second subset of the monitored component parameters within a rule base;

inferring the respective influences that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter using the knowledge incorporated within the rule base; and

producing one or more of propositional statements or quantified statements that express the respective influences that the each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

39. (**Previously Presented**) The system of claim 27, wherein the one or more data mining algorithms include a fuzzy logic algorithm that comprises:

translating the first subset of the monitored component parameters and the second subset of the monitored component parameters into a plurality of respective fuzzy concepts;

determining grades of membership that the first subset of the monitored component parameters and the second subset of the monitored component parameters have in the respective fuzzy concepts, wherein the grades of membership quantify transitions between a plurality of states in a state transition graph; and

inferring the respective influences that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter from the grades of membership that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have in the respective fuzzy concepts.

40-48. (**Cancelled**)

49. (**Currently Amended**) A computer-readable medium containing computer-executable instructions for providing service analysis in service level management, wherein executing the computer-executable instructions on a computer causes the computer to:

provide a service over a network having a plurality of network components that support the service, wherein performance of the service depends upon performances of the plurality of

network components that support the service, and wherein the service has a state that represents the performance of the service;

monitor a plurality of component parameters for the plurality of network components that support the service across a plurality of domains of the network;

map the plurality of component parameters monitored across the plurality of domains of the network to a service parameter that represents the state of the service, wherein the state of the service indicates whether the service conforms to an agreed upon service level identified in a service level agreement;

monitor the service parameter that represents the state of the service to detect a change in the state of the service;

execute one or more data mining algorithms to discover respective influences on the service parameter for a first subset of the monitored component parameters in a first domain of the network in response to detecting the change in the state of the service;

execute the one or more data mining algorithms to discover respective influences on the state of the service parameters for a second subset of the monitored component parameters in a second domain of the plurality of domains of the network in response to detecting the change in the state of the service; ~~and~~

identify ~~at least~~ one of the ~~component parameters in the~~ first subset of the monitored component parameters or the second subset of the monitored component parameters as <u>including</u> the cause of the change in the state of the service<u>; and</u>

<u>identify at least one of the component parameters in the identified subset of the monitored component parameters as the cause of the change in the state of the service</u>.

50. (**Previously Presented**) The computer-readable medium of claim 49, wherein the service parameter has a value that indicates whether the state of the service conforms to the agreed upon service level identified in the service level agreement.

51. (**Previously Presented**) The computer-readable medium of claim 50, wherein executing the computer-executable instructions on the computer further cause the computer to organize the plurality of component parameters monitored across the plurality of domains of the network into a time ordered set of parameter vectors that reflect the state of the service over an interval that includes a plurality of time increments.

52. (**Previously Presented**) The computer-readable medium of claim 51, wherein executing the computer-executable instructions on the computer further cause the computer to:

determine that the time ordered set of parameter vectors reflects that the state of the service conformed to the agreed upon service level at a first one of the plurality of time increments in the interval; and

detect the change in the state of the service in response to the time ordered set of parameter vectors further reflecting that the state of the service did not conform to the agreed upon service level at a second one of the plurality of time increments in the interval.

53. (**Previously Presented**) The computer-readable medium of claim 51, wherein executing the computer-executable instructions on the computer further cause the computer to:

determine that the time ordered set of parameter vectors reflects that the state of the service did not conform to the agreed upon service level at a first one of the plurality of time increments in the interval; and

detect the change in the state of the service in response to the time ordered set of parameter vectors further reflecting that the state of the service conformed to the agreed upon service level at a second one of the plurality of time increments in the interval.

54. (**Previously Presented**) The computer-readable medium of claim 49, wherein the one or more data mining algorithms include a rule induction algorithm that comprises producing a plurality of rules that represent the respective influences that the first subset of the monitored component parameters have on the service parameter and the respective influences that the second subset of the monitored component parameters have on the service parameter.

55. (**Currently Amended**) The computer-readable medium of claim 54, wherein the one or more rules include one or more of[[,]] propositional statements or quantified statements that represent respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

56. (**Previously Presented**) The computer-readable medium of claim 54, wherein the one or more data mining algorithms further include a neural network algorithm that comprises:

identifying a case library that includes a plurality of cases representing episodes of problem solving;

applying the plurality of rules to identify one or more of the cases in the case library that are relevant to discovering the respective influences for the first subset of the monitored component parameters and the second subset of the monitored component parameters; and

adapting one or more solution variable associated with the identified cases using parameterized adaptation logic to discover the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

57. (**Previously Presented**) The computer-readable medium of claim 49, wherein the one or more data mining algorithms include a decision tree algorithm that comprises:

producing a decision tree that represents the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter; and

representing the respective influences that the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter using one or more of numeric values or binary values.

58. (**Previously Presented**) The computer-readable medium of claim 49, wherein the executing the computer-executable instructions on the computer further cause the computer to generate an alarm in response to detecting the change in the state of the service.

59. (**Previously Presented**) The computer-readable medium of claim 49, wherein the one or more data mining algorithms include a top N algorithm that comprises:

identifying a predetermined number of the component parameters in the first subset of the monitored component parameters and the second subset of the monitored component parameters that have a greatest influence on the service parameter; and

producing a list that includes the identified component parameters having the greatest influence on the service parameter, wherein the identified component parameters are listed in a decreasing order of the respective influences that the identified component parameters have on the service parameter.

60. (**Previously Presented**) The computer-readable medium of claim 49, wherein the one or more data mining algorithms include an inductive logic algorithm that comprises:

incorporating knowledge relating to the plurality of domains of the network and knowledge relating to the first subset of the monitored component parameters and the second subset of the monitored component parameters within a rule base;

inferring the respective influences that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter using the knowledge incorporated within the rule base; and

producing one or more of propositional statements or quantified statements that express the respective influences that the each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter.

61. (**Previously Presented**) The computer-readable medium of claim 49, wherein the mining algorithms include a fuzzy logic algorithm that comprises:

translating the first subset of the monitored component parameters and the second subset of the monitored component parameters into a plurality of respective fuzzy concepts;

determining grades of membership that the first subset of the monitored component parameters and the second subset of the monitored component parameters have in the respective fuzzy concepts, wherein the grades of membership quantify transitions between a plurality of states in a state transition graph; and

inferring the respective influences that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have on the service parameter from the grades of membership that each of the first subset of the monitored component parameters and the second subset of the monitored component parameters have in the respective fuzzy concepts.

62. (**Cancelled**)